DOCUMENT RESUME

ED 311 226 CE 053 213

AUTHOR Seaman, Don F.; McCallister, Joe Michael
TITLE An Evaluation of Computer-Assisted Instructional Systems Used to Deliver Literacy Services for J.T.P.A. Participants at Houston Community College.
INSTITUTION Texas A and M Univ., College Station. Texas Center for Adult Literacy and Learning.
SPONS AGENCY Houston Community Coll. System, Tex.
PUB DATE Dec 88
NOTE 31p.
PUB TYPE Reports - Evaluative/Feasibility (142)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Adult Basic Education; Adult Literacy; Basic Skills; *Computer Assisted Instruction; *Equipment Evaluation; Functional Literacy; *Instructional Material Evaluation; *Literacy Education; Two Year Colleges
IDENTIFIERS *Houston Community College TX; *Job Training Partnership Act 1982

ABSTRACT

A study evaluated use of computer-assisted instructional (CAI) systems to deliver literacy training for Job Training Partnership Act (JTPA) participants at the Texas Center for Adult Literacy and Learning. Participants, who were categorized as upper-level students (7th-12th grade equivalents) or lower-level students (0-6th grade equivalents), were given the Test of Adult Basic Education as a pre- and posttest to identify increases in reading, mathematics, and language. Participant attitude surveys were also administered in pre- and posttests, and participants, teachers, and administrators were interviewed. The following results were among those reported: (1) overall increases were shown in each skill area; (2) the CAI systems were most useful in supporting reading and math instruction, although upper-level students also benefited from the language components of the CAI systems; (3) with lower-level students, the more effective CAI systems were those that were integrated with traditional teacher/student instruction, although upper-level students were equipped to work with CAI systems in self-directed modes; (4) student and staff attitudes were positive; (5) the PLATO/CCC configuration was clearly the most effective system for supporting math instruction and was also effective as a support for language (Plato is the name of computer software developed by the Control Data Corporation and CCC means Computer Curriculum Corporation); and (6) the lowest-skilled groups of learners benefited less than more skilled students from CAI. (Appendices list teacher observations and recommendations, student comments, and important aspects of CAI.) (CML)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED311226

An Evaluation of Computer-Assisted Instructional Systems Used to Deliver Literacy Services for J. T. P. A. Participants at Houston Community College

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☑ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

D Seaman
J M McCallister

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

Prepared by:

Don F. Seaman and Joe Michael McCallister

The Texas Center for Adult Literacy and Learning

College of Education

Texas A&M University

BEST COPY AVAILABLE

CE 053213

This report was prepared for Houston Community College under Contract Number 33, funded by the Houston Job Training Partnership Council through section 123 of the Job Training Partnership Act of 1982. The authors undertaking this project were encouraged to freely express their opinions. Points of view or opinions expressed in the report do not, therefore, represent the official policy or position of the Houston Job Training Partnership Council or the Houston Community College District.

An Evaluation of Computer-Assisted Instructional Systems Used to Deliver Literacy Services for J.T.P.A. Participants at Houston Community College

Executive Summary

In August, 1988, the Texas Center for Adult Literacy and Learning (TCALL) was retained by the J.T.P.A. literacy services project of Houston Community College (HCC) to perform an evaluation of the computer-assisted instructional (CAI) systems that being used to deliver literacy training for J.T.P.A. participants. The study was completed in December, 1988. At the time of the study, the project was using the following systems: Computer Curriculum Corporation (CCC), Comprehensive Competencies Program (CCP), Control Data's PLATO system, and IBM's PALS system. In addition, the TCALL staff was to examine the participant attitudes, scheduling procedures, management systems, and intake/validation procedures.

Literacy services were being offered at two HCC campuses-- the Main campus which served the upper level, pre-GED participants (7-12th grade equivalents) and the Leeland campus, which served participants working on lower grade levels (0-6th grade equivalents).

The physical arrangement of the program and scheduling considerations dictated the research design. Students were grouped so that they would experience two different CAI systems during the span of the study. The groups were: Leeland Campus-CCC/CCP and CCP/PALS, and Main campus-CCC/PLATO. This arrangement was not the ideal research design. However, when taking into account that services to all of the participants were to continue through the research period and the disruption that a more refined plan would have caused in the education of the participants that were being served at that time, this was deemed by the TCALL and HCC staff to be the most useful design. There were two sets of students in each CAI group, one set working with the systems for four weeks, and a second group working for six weeks. These groups were intended to indicate increase in student learning in relation to time on the systems. The HCC staff pre-and posttested the participants with the Test of Adult

Basic Education to discern the participants increase in skills in the areas of reading, mathematics, and language. Participant attitude surveys were administered to the participants in a pre-and posttest design. In addition extensive interviews of participants, teachers and administrators were conducted.

Results of the participants pre-and posttests of reading, mathematics, and language skills indicated the following:

1. Participants in the HCC literacy program are learning at significant rates. Overall increases were shown in each skill area. It is apparent from the data that students improve both their skills and their efficiency at working with the CAI systems as they become more experienced.
2. The CAI systems are most useful supporting reading and mathematics instruction, although upper level students benefit substantially from the language components of the CAI systems.
3. With lower level students, the more effective CAI systems are those that are integrated with traditional teacher/student instruction. CAI systems are excellent support systems for instruction, but do not replace the need for teacher/student interaction.
4. Upper level students, who have a stronger skills base than students in lower groups, are the best equipped to work with CAI systems in self-directed modes. It is necessary for students to have a reasonable background of basic skills before they are prepared to work exclusively with CAI systems that are not designed with ongoing teacher interaction.
5. Student and staff attitudes are positive which is a definite indicator of a successful program.
6. Specific observations on the CAI systems include:

- ❑ The PALS system appeared to be the most effective system for reading instruction. This is especially significant as this system is designed to be used with low, or beginning level, students and is an integrated teacher/technology teaching system allowing the students to learn with a variety of methods and with planned, intense interaction with the instructor.
- ❑ The PLATO system was effective as a support tool for upper division students. It is very useful with self-motivated students who have sufficient skills to work in self-directed situations.

- ❑ The PLATO/CCC configuration was clearly the most effective system for supporting math instruction.
- ❑ The PLATO/CCC configuration was effective as a support for language instruction.
- ❑ The CAI systems in use at the Leeland campus were effective when used to support reading with students in the 4th-6th grade levels. Grade level increase for those students with lower starting levels was slower, but this is not surprising as these students have little skills upon which to build. The PALS system produced significant gains with this group.
- ❑ CCC/CCP math instruction appears to be beneficial to some students as a support for traditional math instruction.
- ❑ The lowest groups of learners do not benefit as much members of the other groups from CAI math instruction.
- ❑ Language instruction on CAI systems is most useful in mid- and upper-grade levels. Students in the lowest levels do benefit from this instruction, but at a much lower rate.
- ❑ The efficacy of CCP as a CAI system was not clearly defined in this study. Further study needs to be done of the degree to which the CCP CAI components are being fully utilized and whether the existing materials are pertinent to the needs of the students.
- ❑ The most efficient CAI systems for the lower- and mid-level students have strong, integrated teacher components.
- ❑ CAI is a useful tool to support traditional teaching, but should in no way be considered a way of replacing teachers or increasing teacher/student ratios.

Observations of related areas include:

- ❑ CAI instructional packages are useful aids in literacy education but they do not take the place of traditional teacher/student instruction.
- ❑ The Houston Community College J.T.P.A. literacy program needs more teaching staff so that:
  1. Class size can be reduced, particularly at the Leeland campus.
  2. Students will have trained staff members to assist them when working with the CAI systems.

3. More individualization of student instructional plans can be accomplished.

- ❑ Teachers are dedicated, overworked individuals. However, there seems to be little coordination of their efforts. Closer coordination of teachers' planning for students is needed. Staff should be given training on <u>all</u> systems to facilitate planning functions.
- ❑ Additional workstations are needed on all of the learning systems. With more work stations, the number of students in teacher/student learning situations would be reduced.
- ❑ The time between initial application and actually entering classes should be reduced.
- ❑ Students are positive, encouraged, and excited, in most cases. They do fear, however, that the program is, for some reason, in danger of being eliminated. Such rumors must be dispelled if possible.
- ❑ Students, in general, prefer more difficult materials and more time from teachers.
- ❑ Having each participant on the Main campus use the CCC station each day is not an effective implementation of the CAI system.

If a substantial number of additional stations are not to be forthcoming, then the present Main campus installation should be utilized in one of the following ways:

1. The stations should be used only as remediation, practice, and drill opportunities for students who need specific work on particular subject areas. Students should be scheduled at the stations on an "as needed" basis and the present schedule should be dropped.

2. These stations should be moved to the Leeland campus to reduce the student pressure on the limited number of stations in that CCC lab.

- ❑ It is important that the CAI components be integrated into the students educational experience. The following modifications would facilitate this integration:

Student scheduling should be dictated by the educational needs of the participants and not administrative convenience.

All the teaching staff should be trained on each system so that they can specifically prescribe the learning activities needed by each student both in traditional classes and on CAI systems.

The emphasis of the CAI systems should be to serve as supplemental to the efforts of the instructional staff.

- The previous modifications would have several positive effects on the program including:

  The teaching staff's role would become more central to the learning program.

  The CAI system activities would become more relevant to the participant.

  The CAI systems would be more integrated into the fabric of the educational program as opposed to added on to the existing program.

An Evaluation of Computer-Assisted Instructional Systems Used to Deliver Literacy Services for J.T.P.A. Participants at Houston Community College

Rationale

The Job Training Partnership Act (JTPA) was designed to provide assistance to individuals who are experiencing barriers to employment. One of the most influential barriers appears to be the lack of basic literacy skills of potential employees combined with fast-changing technology in the workplace. Employers, adult educators, and policy experts have all begun to warn that the United States is facing a "basic skills crisis" when great numbers of older youth and adults do not possess the basic literacy skills needed for employment. In our changing economy, these basic skills will, in themselves, soon be insufficient for entry into the workplace.

The JTPA has made efforts to alleviate the crisis through increased programs for "at risk" youth and increased training programs for adults deficient in reading, writing, and computational skills. Computer-assisted instruction is one area which has shown promise of successful learning by adults who have not succeeded in regular "schooling" programs. It is also an effective way of continuing the education of students who may have been successful in traditional school settings but had to interrupt their education for some reason. However, the use of computers has definite problems, as identified in a report by Education TURNKEY Systems, Inc. These include:

1. Information - Staff are unaware of the potential benefits of technology and often cannot define specific needs of computer program utilization.
2. Funding Constraints - Operating budgets have no provision for expensive expenditures which must be amortized over several years.
3. Software Designed for Adults - Learning should be acquired within the context of the workplace.

Add to these the problem of determining which, among those systems available, is more effective in providing learning. Is one system

more effective? If so, at which levels, and why? Although extensive research - based studies would be needed for conclusive answers, some valuable information for local program administrators can be obtained through short-term, on-site investigations in local programs. Such was the nature of this project.

TCALL Staff Involvement

In May, 1988, an informal meeting of selected individuals concerned with adult illiteracy in Texas was held at Texas A&M University. During the meeting Dr. Monroe Neff of Houston Community College, indicated that the College, through the Private Industry Council (PIC) in Houston, had expressed the need for an evaluation of computer assisted instruction (CAI) systems in their adult literacy programs, but had no responses. Subsequent conversations resulted in a proposal from the staff of TCALL (Texas Center for Adult Literacy and Learning) which eventually was accepted. The evaluation project was carried out in two phases. A survey and planning component was performed in August of 1988 with the evaluative portion being performed in the period September through December, 1988.

This study was designed to consider a variety of aspects of the HCC/JTPA literacy service delivery unit. Among these were student attitudes, teacher and administrative staff attitudes, student intake and administration, and comparative student progress on the Computer Curriculum Corporation (CCC), Comprehensive Competencies Program (CCP), IBM PALS, and Control Data Corporation's PLATO CAI systems. Student attitudes were sampled through interviews and the use of two instruments, the Computer Attitude Scale, adapted from previous work at Texas A&M, and the Student Attitude Scale, provided by the Control Data Corporation. Teacher and administrative staff attitudes were sought through a series of interviews and activities designed to facilitate the sharing of opinions in non-threatening situations, which included private interviews and the use of anonymous reporting forms. The staff and students were uniformly cooperative and eager to assist in the study.

Student progress was measured through the use of a test/retest design. At intake the students were all given the Test of Adult Basic Education (TABE). At the end of the study period, the students were retested to assess their progress. All TABE tests were administered by HCC staff. The TCALL representatives visited the HCC literacy facilities on several occasions and conducted initial interviews with the literacy instructional and administrative staff. Student scheduling and administration are examined to discover the most efficient and least obtrusive methods of conducting the review project. It was decided that assessing students to one method of instruction, which is the best experimental design under traditional laboratory conditions, was not the best design for this project. The reasons for this decision were:

1. Scheduling students to work for their entire instructional day at one type of computer work station would have negative effects on the student's attitude, attendance, and learning.
2. One-system scheduling would divorce many students from contact with traditional student/teacher instructional interaction.
3. One-system scheduling would disrupt the operation of the on-going literacy delivery operation and have negative effects on those students who were not involved in the study.

The research design was constructed to place the students in groups which would allow them to participate in two learning systems during the course of the study. The groups were as follows:

Leeland Campus
- CCC/CCP
- CCP/PALS

Main campus
- CCC/PLATO

This grouping had the further aspect of grouping the students by grade level. The students who participate in classes at the Leeland campus generally are working in grade equivalents of sixth grade and below. Those on the Main campus have progressed to the pre-GED levels of seventh

grade and above. Although all of the students on the Main campus did not have upper level grade equivalents in all instructional areas, on average only upper level students had access to the PLATO/CCC configuration. In addition, it was arranged that two subgroups of students would participate in each of the learning systems groups. The two subgroups were based on the length of time that the students had access to the learning systems. One set of subgroups worked for four weeks, and the second set worked for six weeks. These subgroups were instituted so that the students' progress could be compared over differing periods of time. There were eight subgroups selected for the study.

The number of students in each subgroup was determined by the number of work stations available at the two campuses. At the Main campus , there were only three CCC stations available. As the students were to use both CCC and PLATO at this campus, the study was limited to three students in each subgroup. Similarly, the number of work stations in the PALS and CCC labs at the Leeland campus limited these subgroups to eight students in each subgroup.

Student selection for the groups was done by TCALL staff members with the cooperation of the HCC staff. Students were selected randomly for each group with no attempt to place students of particular characteristics into any particular group or subgroup. After being placed into the groups the students were scheduled to work on their assigned systems on an equal time basis; that is for each hour scheduled on one system, the student was scheduled to work on the second system an equal amount of time.

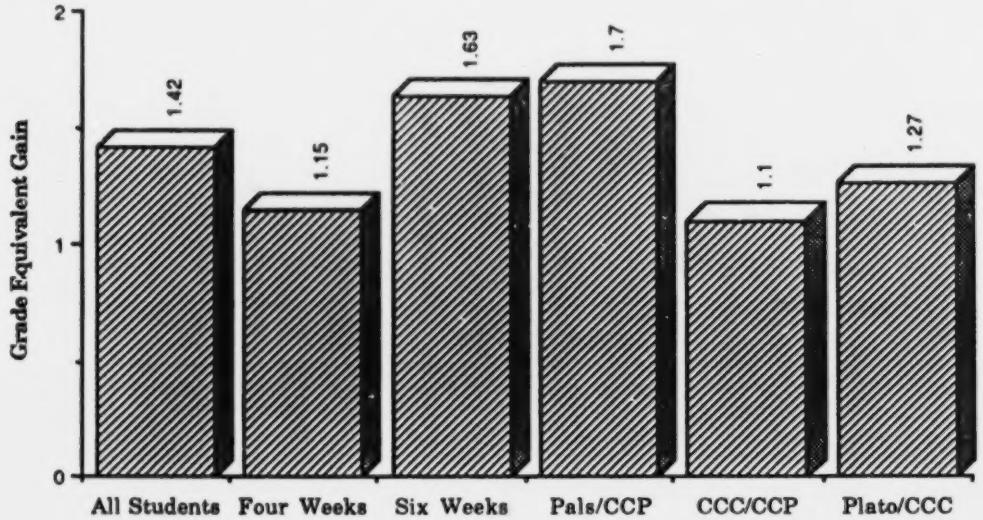
Student Progress in Reading, Math, and Language

Reading

Student scores were highest on the reading subtests. From the data listed below it is apparent that the majority of the students in the program made acceptable progress in reading. It is the feeling of the TCALL staff that during this period, the computer-based portion of CCP was underutilized due to staffing problems. With this understanding, it is very likely that PALS, for students in the lower grade levels, and PLATO, for students in the upper grade levels, outperformed CCC as a reading

instruction tool. It is also important to note that those who had six weeks exposure turned in appreciably higher scores.

Figure 1 Grade level gains in reading scores.



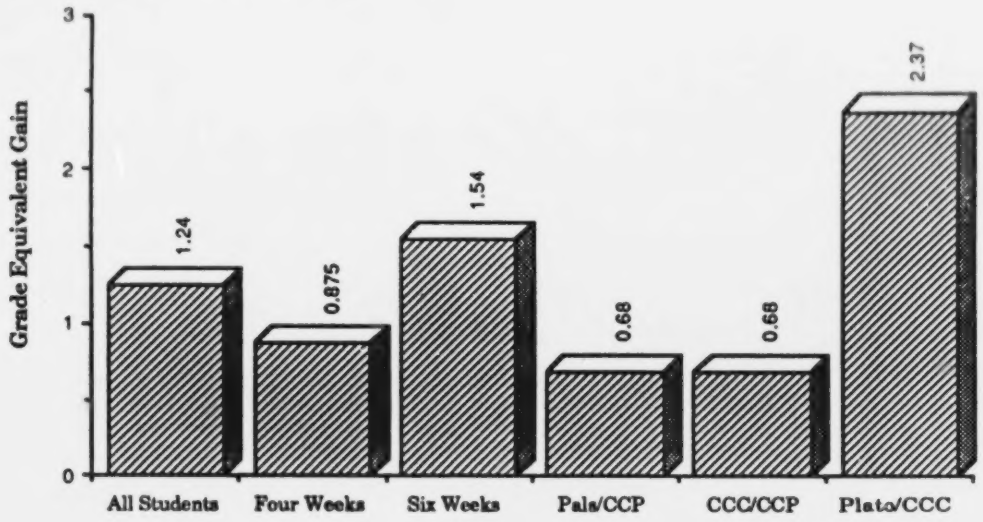
Note: The values represented in these figures represent average student grade level equivalent gain over the span of the study.

Mathematics

It is interesting that average student scores in the six week group were much higher in mathematics than those of the four week group. Again CCC appeared to be the least effective system as it performed on the same level as the PALS system, which provided no additional math instruction to the members of the Leeland subgroup. Lower level students, who have a less strong skill base in math have less success working on CAI drill and practice activities that do not have a strong teacher facilitated component. PLATO appeared to be a very effective tool for upper division students. Some members of this group made very significant gains in their math grade levels. This is a reasonable expectation, as upper level students are capable of working with a computer on drill and practice math activities with little teacher supervision. The scores on this group were

effected by a small group of students with very high math gains and student attrition, which caused many students not to be available for the posttest.

Figure 2 Grade level gains in mathematics.

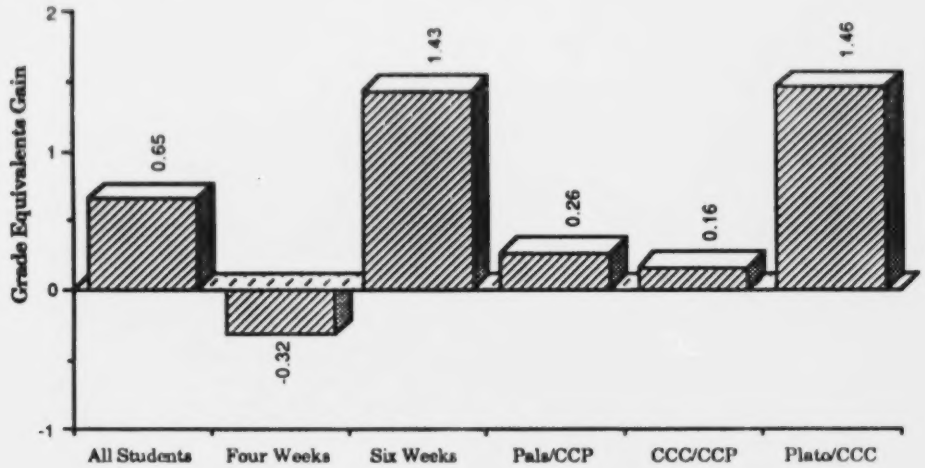


Language

Language average scores were the weakest of the three. This is not surprising, as effective language instruction is interactive and based on the feedback of the teacher given in discussions with the student. PLATO appears to be an effective language tool for upper division students, as only the upper level students at the Main campus had access to the system. These students can work with a CAI system on a self-directed basis and benefit from the structured materials administered by the system. It is important to remember that these students have a stronger skill foundation and a function of this is that they may experience higher scores and work with greater facility in this area. In like fashion, lower level students progress more slowly as they build their skill bases. Before a lower level student can make rapid progress in language, he must become a confident and independent reader. Once these skills are learned, then language scores will rise. The low values in the "Four Week" category may be an indication of the participants encountering particular difficulty in working

with the CAI systems in language development when first learning the system. The marked upswing in scores for the "Six Week" group may indicate increased progress as the participant became more efficient in using the CAI systems.

Figure 3 Grade level gains in language.



Student Progress by Initial Grade Level Compared with Time on the CAI system

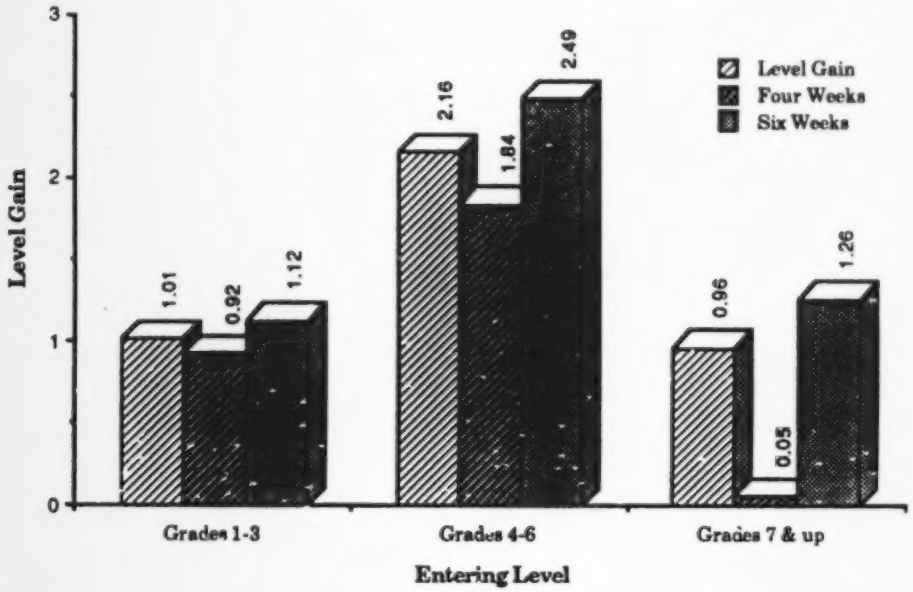
Reading

Although all students progressed in reading, those in the fourth through sixth grade levels had the greatest increases. This result is complicated by students who had extremely high level of growth. In addition, as the students in this group approach the grade levels that determine their assignment to the Main campus from the Leeland campus, representatives of this group of high scoring students, worked with each type of CAI system. Test error or data entry error may have influenced these higher scores.

Reading scores increased the least in the higher grade levels, which is not particularly surprising as these students entered the project with reasonably strong reading skills. It is likely as these students reach the

levels at which their reading becomes easier, requiring less effort, their attention to these activities wanes. This is characteristic of adult students who typically learn best only those things that they see as pertinent to their particular needs. Please see Figure 4 for a representation of the student scores in reading. Please note that the very low value in the "Four Weeks, 7 & Up" category represents only one participant.

Figure 4 Grade level gains in reading over time in relation to participant's entering grade level.

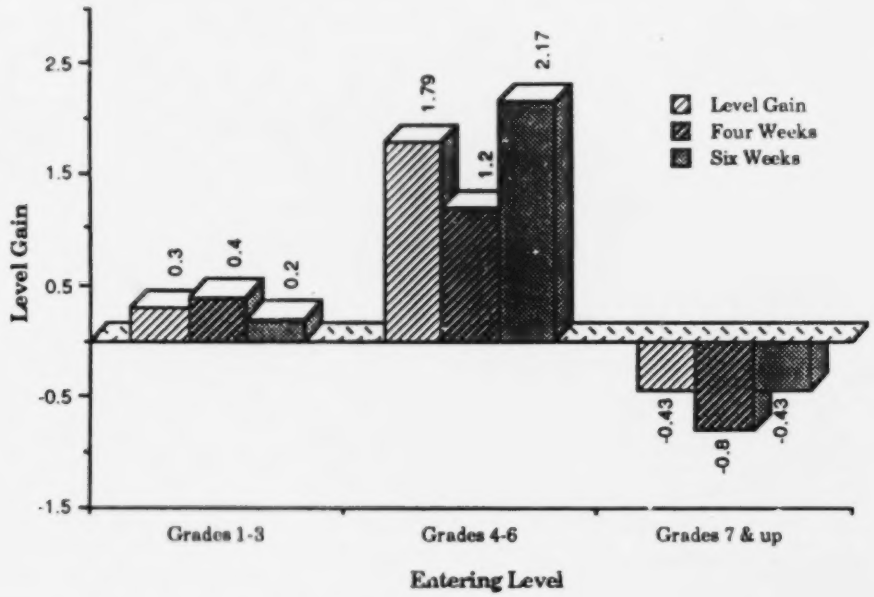


Mathematics

Math scores, like reading scores, are best in the fourth through sixth grade group. It is interesting to note that the highest grade level group, which was predominantly working with PLATO, turned in the lowest scores. This is likely to be an incorrect indication because of the effects of random grouping, attrition, and absenteeism on posttest days, which resulted in few students in this group who started the program at the 7th grade or higher level. Many students did progress beyond the 7th grade

level, but as their starting point was outside this subgroup, the scores were represented in the results of the other subgroups.

Figure 5 Grade level gains in math over time in relation to participant's entering grade level.

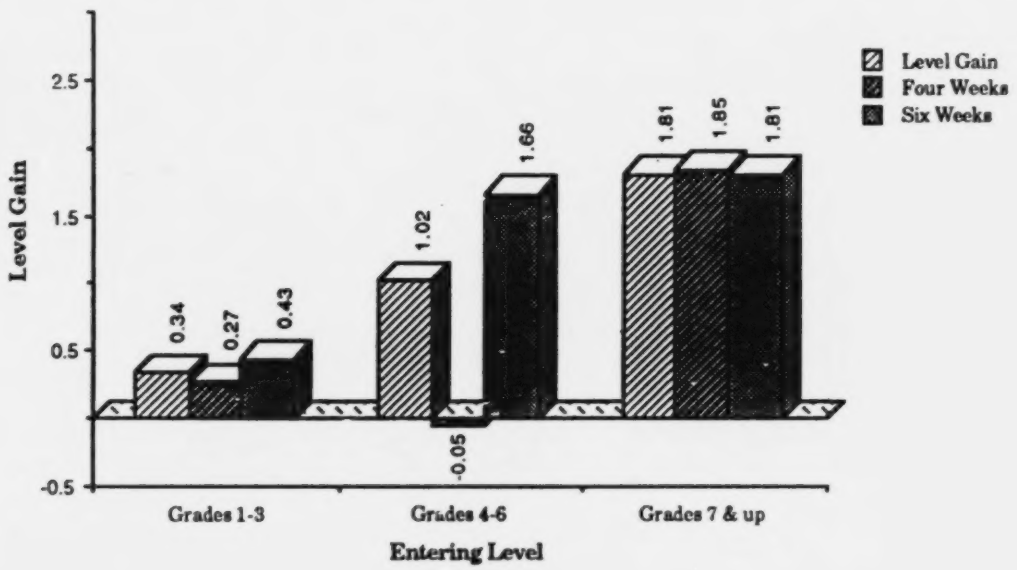


Language

Average language grade level gains are less impressive of the three groups as is indicated in Figure 6. These data are complicated by small groups and unusually high and low scores by some students. Indications are, however, that the CAI language instruction for lower level students is not as effective as for the higher levels. This result mirrors the result discussed earlier and is contributed to by the lower level students' lack of reading skills. Language activities on the PLATO/CCC systems did produce respectable gains in comparison to the systems in use at the Leeland campus. This too can be attributed to the upper level students, with their stronger skill bases, being able to work in a self-directed fashion, and relating well to the type of activities supplied by the CAI systems. The

negative score in the 4th-6th grade subgroup represents a very small group of students.

Figure 6 Grade level gains in language over time in relation to participant's entering grade level.



Comments on the CAI Systems

1. The PALS system appeared to be the most effective system for reading instruction. This is especially significant as this system is designed to be used with low, or beginning level, students and is an integrated teacher/technology teaching system allowing the students to learn with a variety of methods and with planned, intense interaction with the instructor. The PLATO system was effective as a support tool for upper division students. It is very useful with self-motivated students who have sufficient skills to work in self-directed situations.

2. The PLATO/CCC configuration was clearly the most effective system for supporting math instruction. As has been stated before, CAI is an

excellent approach for delivering drill and practice teaching activities. These activities are especially suited upper level students who are building on their math skill bases. Many of the students in this group made very substantial grade level gains.

3. The PLATO/CCC configuration was effective as a support for language instruction. Although neither of the systems on the Leeland campus produced high scores in language, it is important to remember that CAI language instruction for lower level students is inferior to teacher/student interaction.

4. The CAI systems in use at the Leeland campus were effective when used to support reading with students in the 4th-6th grade levels. Grade level increase for those students with lower starting levels was slower, but this is not surprising as these students have little skills upon which to build. The PALS system produced significant gains with this group.

5. Average level gains for upper grade gains were positive. The CAI systems proved to be effective support for students who are motivated to work at their own pace to increase their reading ability.

6. Grade level gain for math in this study produced negative scores. Further study needs to be done to discern wether this is an accurate representation of the effectiveness of these systems. In these student groups, attrition, absenteeism, and placement may have robbed the subgroup of the more able students.

7. CCC/CCP math instruction appears to be beneficial to some students as a support for traditional math instruction. However, the lowest groups of learners do not benefit as much from CAI math instruction.

8. Language instruction on CAI systems is most useful in mid- and upper-grade levels. Students in the lowest levels do benefit from this instruction, but at a much lower rate.

9. The efficacy of CCP as a CAI system was not clearly defined in this study. During the study, the CCP lab was understaffed or unstaffed for most of the period. Further study needs to be done of the degree to which the CCP CAI components ar being utilized and as to whether the existing materials are pertinent to the needs of the students. It is important to note that the teacher administered portion of the CCP curriculum was one of the most beneficial components of the literacy program, as observed by the researchers.

10. The most efficient CAI systems for the lower- and mid-level students have strong, integrated teacher components. This coincides with existing research in the field of adult education (Please see Appendix C for further information). It is the complementary nature of the teacher and the CAI components that produce the most useful integration of the computer systems into the curriculum.

11. CAI is a useful tool to support traditional teaching, but should in no way be considered a way of replacing teachers or increasing teacher/student ratios. Adult learners learn best from interaction with teachers. The main strength of the program should lie in the teaching staff. Additionally, the teaching staff are the people best prepared to implement the CAI systems into the curriculum, prescribe the CAI components most needed by the students, and design student learning activities and scheduling.

Attitude Scales

The attitude scales given to the students were negatively affected by attrition. Of the eight possible subgroups of scores, only five subgroups had sufficient membership at the time of the posttest for reporting. In each case, an increase in the scores reported shows a positive change in attitude. Unfortunately, student attrition and absenteeism affected this portion of the program much more that the TABE based information. Three groups of student had incomplete scores and were not usable. The balance is represented below. The Student Attitude Scale scores were as follows:

	Pretest	Posttest
Main Campus Group 1 (6 weeks)	2.19	2.23
Leeland Campus Group 1 (6 weeks)	2.34	1.92
Leeland Campus Group 2 (4 weeks)	1.77	2.21

The Computer Attitude Survey scores were as follows:

Main Campus Group 2 (4 weeks)	1.18	1.31
Leeland Campus Group 1 (6 weeks)	1.81	1.51

It is interesting to note that the Leeland Group 1 had lower scores in both scales. It is likely that these students, in their sixth week of instruction, were just reaching the learning phase where the novelty of computers was wearing off and frustration was beginning. This is a common phenomenon and attitudes generally rise again after the students' skills in working with the computer increase. Administration of attitude scales over longer periods of time are likely to produce more positive results.

TCALL Staff Observations

The following is a list of observations that was collected from the four TCALL staff member that worked on this project. They are not presented in any particular order and are presented in this manner to facilitate the reader's considering them on a point-by-point basis.

CAI instructional packages are extremely useful aids in literacy education. They do not, however, take the place of traditional teacher/student instruction. As remediation, drill & practice, and supportive activities, CAI systems are excellent and should be used in this manner.

The Houston Community College J.T.P.A. literacy program needs more teaching staff so that:

1. Class size can be reduced in the CCP classroom.

2. Students will have trained staff members to assist them when working with the CAI systems.
3. More individualization of student instructional plans can be accomplished. Adult students work best with the most efficiency and the best morale when they feel that they are learning pertinent, useful material which is designed to help them overcome their particular problems. At present staffing levels, this is extremely difficult.

Teachers are dedicated, overworked individuals. However, there seems to be little coordination of their efforts. The students are working at a variety of CAI units on a variety of activities that may not be closely linked to learning needs. Closer coordination of teachers' planning for students is needed. Staff should be given training on all systems so they understand how all of the parts fit together in a concentrated effort. This will facilitate the planning functions.

Additional workstations are needed on all of the learning systems. With more work stations, the number of students in teacher/student learning situations would be reduced. Students voiced frustration in this aspect repeatedly.

Eliminate or at least reduce the time between initial application and actually entering classes. This probably causes some students to opt out of the program before they even get started.

Many of the student files, test data, attendance information, and other types of student related information could be more easily handled on a simple computerized database in a small computer. This would also greatly speed up report generation and analysis of the effectiveness of the program.

Students are positive, encouraged, and excited, in most cases. They do fear, however, that the program is, for some reason, in danger of being eliminated. Such rumors must be dispelled if at all possible. They discourage everyone.

Students, in general, prefer more difficult materials and more time from teachers. They like interacting with the various learning technologies. Those who are most comfortable with the machines often request more advanced subject content with which to work. Success in working with the technologies is a great motivational tool for the students. Many of them look at these skills as useful in looking for a job after completing the program.

Having each participant on the Main campus use the CCC station each day is not an effective implementation of the CAI system. No student has the opportunity to work with the system for a sufficient amount of time to make any significant progress. If a substantial number of additional stations are not to be forthcoming, then the present Main campus installation should be utilized in one of the following ways:

1. The stations should be used only as remediation, practice, and drill opportunities for students who need specific work on particular subject areas. Students should be scheduled at the stations on an "as needed" basis and the present schedule should be dropped.
2. These stations should be moved to the Leeland campus to reduce the student pressure on the limited number of stations in that CCC lab.

It is important that the CAI components be integrated into the students educational experience. For this to take place in a meaningful way, a variety of modifications of the present program administration need to be implemented. These modifications include:

Student scheduling should be dictated by the educational needs of the participants and not administrative convenience. This scheduling can be accomplished by more directly involving the instructional staff in planning the individualized educational plans of each student. Weekly planning meetings should be

implemented to facilitate this action. Team teaching should be encouraged.

All the teaching staff should be trained on each system so that they can specifically prescribe the learning activities needed by each student both in traditional classes and on CAI systems.

The emphasis of the CAI systems should be to serve as supplemental to the efforts of the instructional staff. Members of the instructional staff should work with the counseling staff to identify the educational needs of the participants and develop individualized educational plans for each. These plans would indicate the amount of time that the student would need to work with the CAI systems and would indicate specifically which CAI activities the participant would attempt each week.

These modifications would have several positive impacts on the program including:

The teaching staff's role would become more central to the learning program. These staff members would feel an increased investment in the decision making process and morale would be improved.

The CAI system activities would become more relevant to the participant. This should improve the participant's appreciation of the tasks to which he is assigned on the systems, and make the activities more meaningful and useful to his educational progress.

The CAI systems would be more integrated into the fabric of the educational program as opposed to added on to the existing program. Instead of being an additional educational task for the participant, the CAI systems would become an integral part of the educational program.

Appendix A

Teacher Observations/Recommendations

Since teachers are the key to successful educational endeavors, their comments and reactions were deemed important to this study.

Program Strengths

Computer programs allow students to concentrate on improving their weakest areas. This, combined with periodic testing, enables students to progress somewhat rapidly.

Besides learning academic skills and knowledge, students learn how to operate computers, a skill which also enhances job opportunities.

The program enhances learning in many ways, i.e., explaining math terms and procedures, making basic concepts easier to understand.

For some students, computers increase the holding power of the program - students in the literacy program want more time for learning.

Students develop a sense of belonging. Their self esteem increases as they progress in the program. Immediate feedback from the computers provides this information.

The program, particularly CCC, offers organized work with up-to-date materials.

Program Concerns

There is a great need for more computer terminals, space, and related equipment:

a. In some cases, scheduling only lets the student work on a given subject area per week - not sufficient.

b. Some students need more work in a specific area, but lack of adequate numbers of machines prevents those opportunities.
c. The PALS lab is constantly overbooked.
d. Sometimes, over 20 students are assigned to a lab designed for 16, maximum.

Scheduling should be improved to eliminate problems and provide better learning opportunities:

a. In general, fewer students per class period should be assigned unless more staff and machines are obtained.
b. A more flexible schedule which is student-centered is needed.
c. CCP lab seems to be without staff too much of the time.
d. Boredom is a common theme in student comments. It is likely that some students leave the program for this reason.
e. Students sometimes spent too much time sitting in the CCP classroom with nothing to do.
f. More staff would greatly alleviate some of the scheduling problems.

The intake/screening process needs improvement.

a. The intake process is sometimes disruptive to teachers and students.
b. Students are often put through an entire program (PALS) when only specific skill remediation or learning is needed.
c. The preliminary application that is filled out by student applicants might be discarded. If a JTPA application must be filled out for each applicant this first form is, to a great degree, repetitive.
d. Although the majority of the paperwork involved with student intake and verification is mandated by the JTPA apparatus, the effect on the student is one of frustration and often humiliation. One comment was that the application seemed designed more to keep people out than to facilitate their entry. At some point program sponsors must confront the JTPA officers and negotiate a more effective, streamlined, and student-centered application and documentation process.

e. To facilitate testing at intake, additional assistance for the counseling and testing staff should be considered. If testing could be available more than two days a week, the tests scored expeditiously, and further testing done the same day, the students' number of visits could be reduced and their entry into class could be accelerated.

Some problems, difficult to solve, do affect morale of both staff and students.

a. Computers do threaten some students, particularly older students.
b. Rumors constantly abound about reductions in program finances, staff, machines, etc.
c. Older students may need an introductory course to computers.
d. Teachers have little input into program decisions. Since they work directly with the students, they know the problems and concerns which must be addressed. Teacher attitudes and efficiency would be facilitated if they believed that they had more programmatic and administrative input.
e. Teachers spend too much time with paperwork (documentation), resulting in lower scores, more dropouts, and lower overall morale. It appears that most of the reporting tasks presently done by teaching staff could be more efficiently done by administrative and clerical workers. In no case should these tasks interfere with student/teacher work.
f. The CAI portions of the program should be used to reinforce and enhance traditional teaching. The students suffer from spending time in large classrooms with too few teachers. This is compounded when the students are then scheduled in CAI classes with little teacher support. This is particularly true in CCC and PLATO classes.
g. The computer portions of the CCP program are underutilized. If this is to have an impact on student learning, they must be assigned to work with it regularly, on materials pertinent to the student's present learning agenda and with the assistance of trained instructional staff member.
h. From student and teacher comments it is evident that the students need more familiarization with the CAI units before they

are scheduled to work at the terminals on a regular basis. This will help the students become more comfortable with the technologies before becoming responsible for their own self-paced activities. It should also allow them to learn more quickly.

i. Versions of CCP, CCC, and PLATO are available that can all be run from central computer servers, much like the current CCC lab. If these versions could be secured and one large central lab set up for all of these applications, staff could be reallocated and the students would have greater teacher contact.

j. Teaching staff should be released from doing any form of clerical or reporting function. It was noticed on several occasions that teaching staff was occupied during class with non-teaching functions. It appears that there is sufficient clerical and non-teaching administrative staff to allow these functions to be re-assigned.

Appendix B

Student Comments

Aspects that students like most about the CAI programs followed several main themes. Many students simply enjoy working with the computer. The fact that the CAI packages help the student correct errors and review material was often mentioned as was the fact that the computer generally made the student feel that he was working at his own speed. Learning to type or to manipulate the keyboard was one of the most mentioned positive aspects. Many of the students felt that they were learning faster on the CAI units than they had in other educational situations.

Least liked aspects were more mixed and to some extent contradictory. Many higher level students complained that the computers were too slow, although a significant number complained that everything moved too fast. Many of the students felt that they could not type fast enough to work with the computers. Many students made negative comments that indicated that they did not really understand all of the operational commands of the CAI packages. If the students are not competent on the operation of the systems, it is likely that their scores on the materials do not reflect their actual learning. Many students requested more teacher contact. They felt that they could learn more quickly with a teacher with whom they could interact.

Appendix C

Important Aspects of Computer-Assisted Instruction

A Practice Application Brief entitled *Computer-Assisted Instruction in Adult Literacy Education,* produced by the ERIC Clearinghouse, lists the following research related findings about CAI in literacy instruction:

1. CAI is effective for a significant number of adult learners. Although not all CAI research has shown a statistically significant impact on adult learning, as a method, its effect has been generally positive.
2. CAI is effective because it provides the adult learner with flexibility, control, individualization, privacy, and immediate feedback.
3. CAI effectiveness depends to a great extent upon the instructional staff. CAI should supplement rather than replace instructors or tutors.
4. Undereducated adults generally have positive attitudes towards computers and are interested in using them in their educational programs.
5. CAI effectiveness is limited by the shortage of appropriate software.
6. CAI has not been effective with all learners. CAI is not a panacea. Some adults, particularly older adults, tend to not like working with computers.

The following are some guidelines for effective implementation of CAI instruction:

1. Familiarize all instructional staff, whether full- or part-time, with the CAI aspects of the literacy program.
2. Provide sufficient demonstration time and enough individual assistance for students to feel comfortable using computers.
3. Provide training and inservice opportunities for instructional staff.
4. Use only software that is appropriate for adult learners.

5. Do not think of the computer only as a tool for individual use. CAI can be used by pairs and groups of students.
6. Provide for flexible scheduling of computer use.
7. Do not depend on the computer to be the sole source of instructional support.
8. Provide opportunities for students to develop occupational skills through CAI. (Susan Imel, ERIC Clearinghouse, 1988).